

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A photovoltaic cell module for a receiver of a solar radiation-based electrical power generating system, the module ~~including~~ comprising:

(a) ~~one or more than~~ at least one photovoltaic cell having an exposed surface for solar radiation;

(b) an electrical connection for transferring the electrical energy output of the photovoltaic cell ~~or cells~~ to an output circuit, and

(c) an assembly for extracting heat from the photovoltaic cell ~~or cells~~, the assembly including (i) a housing positioned behind and in thermal contact with the exposed surface of the photovoltaic cell ~~or cells~~, the ~~housing~~ housing including a base and side walls extending from the base, ~~[[with]]~~ the base, the side walls and the photovoltaic cell ~~or cells~~ defining a coolant chamber, ~~[[and]]~~ the housing including an inlet for supplying a coolant into the chamber and an outlet for discharging the coolant from the chamber, and (ii) a coolant member located in the coolant chamber in heat transfer relationship with the photovoltaic cell ~~or cells~~, the coolant member including a plurality of elements ~~beads, rods, bars or balls~~ of high thermal conductivity material ~~that are~~ in thermal contact and ~~[[have]]~~ providing a large surface area for heat transfer and ~~[[define]]~~ defining a three dimensional labyrinth ~~that can conduct~~ for conduction of heat therethrough away from the photovoltaic cell ~~or cells~~ via ~~[[the]]~~ a substantial number of heat transfer pathways formed by the thermally connected elements ~~beads, rods, bars or balls~~ and ~~[[has]]~~ a substantial number of

coolant flow passages for a coolant that, in use of the module, is supplied to the coolant chamber via the inlet and flows through the coolant member and is discharged from the coolant chamber via the outlet.

2. (currently amended) The cell module defined in claim 1 wherein the heat extraction assembly is located wholly behind and does not extend laterally beyond the exposed surface area of the photovoltaic cell ~~or cells~~.

3. (currently amended) The cell module defined in claim 1 ~~or claim 2~~ wherein the elements are selected from the group comprising beads, rods, bars and balls of high thermal conductivity material and the surface area for heat transfer provided by the beads, rods, bars ~~[[or]]~~ and balls of high thermal conductivity material is at least 5 times the surface area of the front surface of the mass of beads, rods, bars ~~[[or]]~~ and balls of high thermal conductivity material that are in direct contact with the substrate.

4. (currently amended) The cell module defined in ~~any one of the preceding claims~~ claim 1 wherein the coolant member at least substantially occupies the volume of the coolant chamber.

5. (currently amended) The cell module defined in ~~any one of the preceding claims~~ claim 1 wherein the coolant inlet is located in either one side wall of the housing or in the base of the housing in the region of that side wall and the coolant outlet is located in an opposed side wall or in the base in the region of that side wall.

6. (original) The cell module defined in claim 5 wherein the coolant member is shaped so that the coolant chamber includes a manifold in fluid communication with

the coolant inlet extending along the inlet side wall and a manifold in fluid communication with the coolant outlet extending along the outlet side wall.

7. (currently amended) The cell module defined in claim 5 ~~or claim 6~~ wherein the housing includes a weir extending upwardly from the base inwardly of the inlet side wall and defining a barrier to coolant flow across the coolant chamber from the coolant inlet.

8. (currently amended) The cell module defined in ~~any one of claims~~ claim 5 ~~[[to 7]]~~ wherein the housing includes a weir extending upwardly from the base inwardly of the outlet side wall and defining a barrier to coolant flow from the coolant chamber to the coolant outlet.

9. (currently amended) The cell module defined in ~~any one of the preceding claims~~ claim 1 wherein the elements are selected from the group comprising of beads, rods, bars ~~[[or]]~~ and balls of ~~[[the]]~~ high thermal conductivity material and the elements have a major dimension of 0.8 - 2.0 mm.

10. (currently amended) The cell module defined in ~~any one of the preceding claims~~ claim 1 wherein the elements are selected from the group comprising of beads, rods, bars ~~[[or]]~~ and balls of ~~[[the]]~~ high thermal conductivity material and the elements have a major dimension of 0.8 – 1.4 mm.

11. (currently amended) The cell module defined in ~~any one of the preceding claims~~ claim 1 wherein the elements are selected from the group comprising ~~packing density~~ of the beads, rods, bars ~~[[or]]~~ and balls of ~~[[the]]~~ high thermal conductivity material

and the elements have a packing density that decreases with distance away from the substrate.

12. (currently amended) The cell module defined in ~~any one of the preceding claims~~ claim 1 wherein the coolant flow passages occupy between 20 and 30 % of the volume of the coolant member.

13. (currently amended) The cell module defined in ~~any one of the preceding claims~~ claim 1 includes a substrate on which the photovoltaic cell ~~or cells are~~ is mounted and to which the housing is mounted.

14. (currently amended) The cell module defined in claim 13 wherein the substrate ~~is formed from or includes one or more than~~ comprises at least one layer of a material that is an electrical insulator.

15. (currently amended) The cell module defined in claim 13 ~~or claim 14~~ wherein the substrate ~~is formed from~~ comprises a material that has a high thermal conductivity.

16. (currently amended) The cell module defined in claim 14 including a plurality of photovoltaic cells and wherein the substrate includes a metallised layer interposed between ~~[[the]]~~ each photovoltaic cell ~~or cells~~ and ~~[[the]]~~ each electrical insulator layer ~~or layers~~.

17. (currently amended) The cell module defined in claim 14 ~~or claim 16~~ wherein the substrate includes a metallised layer interposed between the electrical insulator layer ~~or layers~~ and the coolant member.

18. (currently amended) A method of manufacturing ~~[[the]]~~ a photovoltaic cell module for a receiver of a solar-radiation based electrical power generating system comprising defined in any one of the preceding claims that includes:

(a) at least one photovoltaic cell having an exposed surface for solar radiation;

(b) an electrical connection for transferring the electrical energy output of the photovoltaic cell to an output circuit, and

(c) an assembly for extracting heat from the photovoltaic cell, the assembly including (i) a housing positioned behind and in thermal contact with the exposed surface of the photovoltaic cell, the housing including a base and side walls extending from the base, with the base, the side walls and the photovoltaic cell defining a coolant chamber, the housing including an inlet for supplying a coolant into the chamber and an outlet for discharging the coolant from the chamber, and (ii) a coolant member located in the coolant chamber in heat transfer relationship with the photovoltaic cell, the coolant member including a plurality of elements of high thermal conductivity material in thermal contact and providing a large surface area for heat transfer and defining a three dimensional labyrinth for conduction of heat therethrough away from the photovoltaic cells via a substantial number of heat transfer pathways formed by the thermally connected elements and a substantial number of coolant flow passages for a coolant that, in use of the module, is supplied to the coolant chamber via the inlet and flows through the coolant member and is discharged from the coolant chamber via the outlet;

the method comprising:

[[a)] (d) forming the coolant member by supplying a predetermined mass of the elements ~~plurality of beads, rods, bars or balls~~ of high thermal conductivity

material into a mould of a predetermined shape and thereafter heating the elements
~~beads, rods, bars or balls~~ of high thermal conductivity material and sintering the
elements ~~beads, rods, bars or balls of~~ together to form the coolant member;

~~(b)~~(e) locating the coolant member in the housing; and

~~(e)~~(f) mounting the photovoltaic cell to the housing.

19. (currently amended) A method of manufacturing ~~[[the]]~~ a photovoltaic cell module defined in any one of claims 1 to 17 that includes as set forth in claim 18 further comprising:

(a) ~~forming the coolant member by supplying a predetermined mass of plurality of beads, rods, bars or balls of high thermal conductivity material into the housing and thereafter heating the beads, rods, bars or balls of high thermal conductivity material and sintering the beads, rods, bars or balls of together to form the coolant member within the housing; and~~

~~[[(b)]]~~ mounting the photovoltaic cell ~~or cells~~ to the housing, ~~for example by~~ soldering or sintering the substrate to the housing.

20. (currently amended) The method defined in claim 18 ~~or claim 19~~ includes comprising forming the coolant member from a plurality of elements selected from the group comprising beads, rods, bars and balls of high thermal conductivity material and wherein the coolant member has a surface that forms a contact surface with the substrate and further including grinding the surface of the coolant member that forms a contact surface with the substrate to increase the surface area of contact between the beads, rods, bars ~~[[or]]~~ and balls of high thermal conductivity material and the substrate.

21. (currently amended) A method of manufacturing ~~[[the]]~~ a photovoltaic cell module as set forth in Claim 18 wherein the elements are selected from the group comprising defined in any one of claims 1 to 17 includes forming the coolant member by supplying a predetermined mass of plurality of beads, rods, bars ~~[[or]]~~ and balls of high thermal conductivity and further including material into the housing and locating ~~[[the]]~~ a substrate on the housing and thereafter heating the beads, rods, bars or balls of high thermal conductivity material and sintering the beads, rods, bars or balls ~~[[of]]~~ together to form the coolant member within the housing and bonding the coolant member to the housing and the substrate.

22. (currently amended) A system for generating electrical power from solar radiation ~~which includes~~ comprising:

(a) a receiver ~~that includes~~ having a plurality of photovoltaic ~~cell~~ cells modules for converting solar energy into electrical energy and an electrical circuit for transferring the electrical energy output of the photovoltaic ~~cells~~ modules; and

(b) a means for concentrating solar radiation onto the receiver; and

the system being characterised in that ~~the receiver includes a plurality of the photovoltaic cell modules defined in any one of claims 1 to 16, each said module comprises:~~

(c) at least one photovoltaic cell having an exposed surface for solar radiation;

(d) an electrical connection for transferring the electrical energy output of the photovoltaic cell to an output circuit, and

(e) an assembly for extracting heat from the photovoltaic cells, the assembly including

(i) a housing positioned behind and in thermal contact with the exposed surface of the photovoltaic cell, the housing including a base, and side walls extending from the base, with the base, the side walls and the photovoltaic cell defining a coolant chamber, and the housing including an inlet for supplying a coolant into the chamber and an outlet for discharging the coolant from the chamber, and

(ii) a coolant member located in the coolant chamber in heat transfer relationship with the photovoltaic cell, the coolant member including a plurality of elements of high thermal conductivity material in thermal contact and providing a large surface area for heat transfer and defining a three dimensional labyrinth for conduction of heat therethrough away from the photovoltaic cell via a substantial number of heat transfer pathways formed by the thermally connected elements and a substantial number of coolant flow passages for a coolant that, in use of the module, is supplied to the coolant chamber via the inlet and flows through the coolant member and is discharged from the coolant chamber via the outlet and

an electrical circuit that includes the photovoltaic cell of each module, and a coolant circuit that includes the heat extraction assembly of each module.

23. (new) A system for generating electrical power from solar radiation as set forth in Claim 22 wherein the elements are selected from the group comprising beads, rods, bars and balls of high thermal conductivity.